

घरेलू एवं व्यावसायिक गैस प्रज्जवलन  
उपकरणों से संबंधित — शब्दावली

(दूसरा पुनरीक्षण)

**Terms Relating to Domestic and  
Commercial Gas Burning  
Appliances — Glossary**

(Second Revision)

ICS 75.160.30; 97.040.20

© BIS 2023

---

---



भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDARDS  
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI - 110002  
[www.bis.gov.in](http://www.bis.gov.in)   [www.standardsbis.in](http://www.standardsbis.in)

## FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards after the draft finalised by the Domestic and Commercial Gas Burning Appliances (Pressure Type) Sectional Committee had been approved by the Mechanical Engineering Division Council.

This standard is intended to make available simplified definitions of terms used in the production and trade of domestic and commercial gas-burning appliances. The definitions are given in a manner so that they are generally understood by a user of this standard.

This standard was first published in 1971 and subsequently revised in 1988. This standard is being revised again to keep pace with the latest technological developments and international practices. Also, in this revision, the standard has been brought into the latest style and format of Indian Standards. Some new terms related to gas-burning appliances have also been added with this revision.

The composition of the committee responsible for the formulation of this standard is listed in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding-off numerical values (*second revision*)’. The number of significant places retained in the rounded-off value should be the same as that of the specified value in this standard.

*Indian Standard*

# TERMS RELATING TO DOMESTIC AND COMMERCIAL GAS BURNING APPLIANCES — GLOSSARY

*( Second Revision )*

## **1 SCOPE**

This standard defines the term relating to domestic and commercial gas-burning appliances.

## **2 TERMINOLOGY**

### **A**

**2.1 Aeration-Adjuster** — A device, such as shutter, screw, clip or vane for regulating the amount of air entrained by a jet of gas (air adjuster in case of a furnace).

**2.2 Aeration Number (ATB No.) (A No.)** — The measure if the flame speed of a gas obtained by the use of an aeration test burner, indicative of light-back tendency on aerated burners.

**2.3 Aerated Burner** — A burner in which the primary air has been mixed with the gas before it leaves the burner port's.

**2.4 Air-Gas Ratio** — The ratio of the volume of primary air to the volume gas in a gas air mixture.

**2.5 Air Heater** — An appliance for heating air to be used for space heating.

**2.6 Air Port** — An aperture for admitting combustion air to a burner.

**2.7 Air Shutter** — An adjustable device for varying the size of the primary air inlets.

**2.8 Airing Cupboard Heater** — A heating unit of a low heat output designed for installation in a ventilated cupboard or other suitable small enclosed space to enable it to be used as a airing clothes or household linen, or for similar poses.

**2.9 Ambient Temperature Error** — The change in the controlled temperature produced by a given change in the temperature of the parts of the thermostat other than the sensing element.

**2.10 Anchor Block** — A block surrounding or attached to a pipe to prevent movement of the pipe due to pressure or thermal stress.

**2.11 Appliance Base** — The lowest supporting frame or structure of the appliance, exclusive of legs.

**2.12 Appliance Governor** — A governor installed in or before an appliance to control burner output.

**2.13 Atmospheric Burner** — An aerated burner where the combustion air is entrained at atmospheric pressure.

**2.14 Automatic Boiler** — An appliance with automatic water feed which can give a continuous supply of boiling water.

**2.15 Automatic Ignitor** — An automatic device which ignites the gas in a burner when the valve controlling the gas to the burner is turned on and will relight the flame when the burner gets accidentally extinguished at any setting.

**2.16 Automatic Valve (for Gas Control)** — The automatic device consisting essentially of a valve and operator that controls the gas supply to the burner(s) during the normal operation of an appliance.

**2.17 Axial Tap** — A tap in which one or more valve or pistons moves axially to open and close the ports.

### **B**

**2.18 Backlash** — A control knob movement that does not transmit an effect through the mechanical linkage to the control element of a thermostat.

**2.19 Baffle** — An object placed in an appliance to change the direction of, or retard, the flow of air-gas mixture, or flue gases.

**2.20 Bain Marie** — An appliance for keeping cooked food in bulk in hot condition:

- a) **Open Wall Bain Marie** — A shallow receptacle containing water and heated from below. Pots and pans containing cooked food are stored in to kept hot;
- b) Fitted Container Bain Marie (Wet) — A shallow receptacle containing hot water and having a top provided with containers in which cooked food is stored for being kept in hot condition; and
- c) Fitted Container Bain Marie (Dry) — As (b) but without a water well, in which the containers are kept hot by the circulation of thermostatically controlled hot air.

**2.21 Balanced-Flued Appliance** — A room-sealed appliance in which the combustion air inlet and products outlet are so disposed that wind effects are substantially balanced.

**2.22 Balanced Flue Duct** — The duct within a balanced flue terminal assembly carrying products of combustion from the combustion chamber to the outlet.

**2.23 Balanced Flue Nozzle** — The nozzle forming the outlet end of a balanced flue duct.

**2.24 Bar Burner** — A burner in the form of a length of tubing with a series of burner ports or jets in one or more parallel straight lines.

**2.25 Bio-gas** — Fuel gas produced from cattle dung and/or other biomass.

**2.26 Boiling Table** — An appliance of following types, with one or more individually controlled burners for heating cooking utensils.

- a) *Open Top Boiling Table* — A boiling table in which cooking utensils stand on open metal grids over individual burners and are heated by direct flame contact;
- b) *Solid Top Boiling Table* — A boiling table consisting of smooth metal plate(s) heated by burners underneath; and
- c) *Stockpot Stand/Stove* — A low-level boiling table usually having one burner, with open or solid top, primarily for use with stockpots or for urns, vegetable pans or similar large utensils.

**2.27 Bottled Gas** — Liquefied petroleum gases marketed in pressure containers.

**2.28 Branched Flue System** — A common open flue system in which the products of combustion in each appliance discharge by way of a substantially vertical subsidiary flue into the main flue.

**2.29 Breakfast Cooker** — A small appliance consisting of an oven surmounted either by two boiling burners or by one boiling burner and a grill.

**2.30 Bubble Leak Indicator** — An apparatus for measuring gas leakage rate.

**2.31 Built-in Appliance** — An appliance designed to be used only when installed in another structure or fitment.

**2.32 Burner** — A device for the final conveyance of the gas or a mixture of gas and air to produce a suitable flame which is maintained on or in it.

**2.33 Burner Body** — A main casting or pressing of a burner.

**2.34 Burner Box** — A box in which a burner is situated.

**2.35 Burner Head** — The part of a burner that incorporates the burner ports.

**2.36 Burner Mixing Tube** — A tube connecting the injector and the burner ports, in which the mixing of air and gas takes place.

**2.37 Burner System** — The burner(s) and all controls downstream of a gas isolating valve of the plant or appliance.

**2.38 Burner port flame port** — An aperture in a burner through which gas or a gas/air mixture is discharged for combustion.

## C

**2.39 Cafe set** — A hot beverage appliance comprising an automatic boiler or pressure boiler with attached heated side urns for the storage of hot milk and coffee.

**2.40 Calibration Point** — A point within the working temperature range used for the purpose of checking temperature calibration.

**2.41 Calorific Value (Heat of Combustion)** — The number of heat units liberated by the complete combustion of unit volume or mass of gas under specific conditions.

- a) *Gross Calorific Value* — The sum of the number of heat units liberated by the complete combustion of the unit volume or mass of gas and heat released by condensation of water vapour produced from the condition; and
- b) *Net Calorific Value* — The gross calorific value minus the heat released by the condensation of water vapour produced from combustion.

**2.42 Cap** — An external fitting used to close an outlet. A pipe or fitting so treated is termed capped.

**2.43 Central Heating System** — A fixed system for warming a building from a single source of heat, with manual or automatic control of the operation of the whole system and of the temperatures in the heated spaces.

**2.44 Chimney** — A conduit or structure enclosing a flue connected to the outside air for discharge of combustion products.

**2.45 Closed Position of Thermostat** — That end position of the thermostat setting which results in, or tends to result in the smallest flow of gas through the thermostat.

**2.46 Cock** — A type of valve, used to stop the main supply of a fluid, that is operated by rotation of a drilled or slotted plug and that is normally left in the 'N' position.

**2.47 Cold Condition** — A condition of an appliance required for some tests in which the cold appliance is in thermal equilibrium with its surroundings and in which the gas has not been lit.

**2.48 Combined Appliance** — A combination of two or more appliances having separate functions, each with its own burner and control system, but designed to be installed as a composite unit.

**2.49 Combustion** — A phenomenon of rapid oxidation of fuel accompanied by the production of heat or light.

**2.50 Combustion Chamber** — The portion of an appliance within which the main combustion of fuel occurs.

**2.51 Combustion Characteristics** — Properties of fuel (gas) which influence the behaviour of flame when fuel is burnt.

**2.52 Combination Firing Burner** — A burner system with two or more fuels firing simultaneously on the burner(s).

**2.53 Combustion Products** — The constituents resulting from the combustion of a fuel with oxygen of air.

**2.54 Commercial Butane** — The liquefied C<sub>4</sub> hydrocarbon gases consisting mainly of butanes and/or butylene.

**2.55 Commercial Butane-Propane Mixture** — A liquefied C<sub>3</sub> and C<sub>4</sub> hydrocarbon gas mixture consisting mainly of butanes and or butylene with propane and/or propylene.

**2.56 Commercial Propane** — The liquefied C<sub>3</sub> hydrocarbon gases consisting mainly of propane and/or propylene.

**2.57 Common Flue System** — A share open flue system including branched flue system, serving two

or more appliances installed in the same room or separate rooms or space(s).

**2.58 Concentric Burner** — A burner having concentric rings of different ratings operated by separate gas taps.

**2.59 Condensate** — The liquid which separates from a gas, including flue gases due to cooling effect.

**2.60 Contact Grill/Fry Top/Fry Plate** — A solid metal plate grill heated from below, used for frying.

**2.61 Continental Type Burner** — A burner having burner ports near to the surface being heated and giving flames which extend radially.

**2.62 Controls** — Devices designed to regulate the gas, air, water or electrical supplies to a gas appliance. These may be manual, semi-automatic or automatic.

**2.63 Conventionally-Flued Appliance** — A flued appliance in which the air for combustion is taken from the room in which the appliance is installed and in which the provision is made for the diversion of down draught.

**2.64 Convector** — An air heater that discharges heated air only into the space in which it is installed.

**2.65 Cooking Range** — A heavy-duty cooker designed for domestic or commercial cooking.

**2.66 Cooking Range Back** — An outer panel forming the back of a cooking range.

**2.67 Cooking Range Side Panel (Left Hand, Right Hand)** — A panel forming an outer side of a cooking range.

**2.68 Cooking Space** — The space within an appliance that may usefully be employed for the cooking of food.

**2.69 Crown** — The outer top panel of a cooker oven.

**2.70 Crown Tray/Crown Plate** — A separate enamelled tray having an opening to accommodate burner heads, covering the crown of a cooker oven.

**2.71 Cluster Burner** — An inverted burner in which more than one mantle is fitted.

**D**

**2.72 Damper** — A device used to vary the volume of air passing through a confined cross-section by varying the effective sectional area.

**2.73 Deep Fat Fryer** — An appliance for cooking food by immersion in hot fat or oil.

**2.74 Delay-off Timer** — A control device used in conjunction with an appliance which, when operated, will give a pre-determined period of operation and then switch off.

**2.75 Delay-on Timer** — A control device used in conjunction with an appliance which, when operated, will give a pre-determined period of delay and then allow gas to flow to the appliance.

**2.76 Direct-fired Oven** — An oven in which the products of combustion flow through the oven compartment.

**2.77 Direct Gas Thermostat** — A thermostat in which the main supply of gas to the burner is passed between the valve and valve seating, and is, therefore, directly controlled by the sensing element.

**2.78 Direct Heating** — A method of heating furnaces and ovens in which the hot products of combustion come into contact with the stock.

**2.79 Distant Control/Remote Control** — A device which enables a gas flame to be ignited, extinguished and sometimes controlled from a position distant from the consuming appliance.

**2.80 Door Catch** — The fitting on a cooking range into which the door latch fits when the door is closed.

**2.81 Door Insulation** — A means of reducing the heat flow through the walls of a heated space or object:

- a) *Air Space Insulation* — Insulation consisting of two adjacent surfaces constructed to prevent the full circulation of the air held between them; and
- b) *Solid Insulation* — Any solid material used to obstruct the flow of gas.

**2.82 Door Latch** — The fitting on the cooking range which engages the door catch when the door is closed.

**2.83 Draught** — A pressure below atmospheric at the base of a chimney or in a waste gas flue.

**2.84 Draught Diverter** — A device for preventing conditions in a secondary flue from interfering with the combustion performance of an appliance.

**2.85 Draught Hood** — A device built into an appliance, or made part of the flue pipe from an appliance which is designed to (a) assure the ready escape of products of combustion in the event of no draught, back draught or stoppage beyond the draught hood, (b) prevent a back draught from entering the appliance, and (c) neutralize the effect of stack action of the chimney or gas vent upon the operation of appliance.

**2.86 Draught Stabilizer** — A flue break, the area of which increases with increasing flue draught.

**2.87 Drilled Burner** — A burner giving a multiple number of small flames from individual drilled burner ports.

**2.88 Drying Cabinet** — A cabinet containing heating until for drying or airing of clothes or household linen.

**2.89 Drying Cupboard Heater** — A heating unit specially designed for drying rather than airing, and, therefore, of higher heat output than of airing cupboard heater.

**2.90 Duplex Burner** — A burner designed in two independent sections to be operated as a whole or in part by a single gas tap.

**2.91 Drip Tray** — A tray beneath the evaporator for collecting condensate and sometimes defrost water.

**2.92 Drip Trays** — A tray beneath the evaporator for collecting condensate and sometimes defrost water.

**2.93 Dual Burner** — Two burners fabricated in one unit.

**E**

**2.94 Egg Bar** — A bar to keep eggs in place in a storage space.

**2.95 Excess Air** — Air in excess of the theoretical requirement for combustion fuel.

**F**

**2.96 Facia** — A panel on an appliance through which the control operating mechanisms pass.

**2.97 Family of Gases** — A range of gases characterized by having a wobbe number within specified limits.

**2.98 Flame Blow-off** — Separation of a flame from burner port resulting in extinction.

**2.99 Flame Check** — A gauge, grid or any other portion of the burner assembly used to avert flashback.

**2.100 Flame Detector** — The part of the flame failure device which is responsive to flame properties and signals the presence of flame.

**2.101 Flame Failure** — The loss of flame from the normally detected position due to any cause other than the deliberate de-energising of the safety shut-off valve.

**2.102 Flame Failure Device (Flame Safeguard)** — A control responsive to flame properties, detecting the presence of a nominated flame and, in the event of ignition failure or subsequent flame failure, causing safety shut down.

**2.103 Flame Lift** — Separation of a flame from the burner port, whilst continuing to burn with its some distance from the port. Excessive lifting is termed flame blow-off.

**2.104 Flame Speed** — The rate of linear propagation of flame through a gas-air mixture.

**2.105 Flame smother** — Defective combustion arising when insufficient air reaches a flame and/or the flame burns in vitiated air.

**2.106 Flame Reversal** — The pulling downwards of gas fire flames caused by excessive flue-induced suction through the low-level ventilation opening in the closure plate.

**2.107 Flame Roll-out** — The occurrence, at the moment of ignition, of a transient flame outside the combustion chamber.

**2.108 Flash-Back (Light Back)** — Transfer of combustion from burner port to a point upstream in the gas/air flow into the mixing tube and usually to the injector:

- a) *Direct Flash-Back* — Flash-back through the burner itself; and
- b) *Indirect Flash-Back* — Flash-back by a flame not passing through the burner itself, that is, roll over.

**2.109 Flashing Pilot** — A pilot with means of projecting a burst of flame to reach a burner port for ignition purpose.

**2.110 Flash Tube (Lighting Tube)** — A device for igniting gas burner in which a flame is made to travel to the burner ports through a tube in which an inflammable mixture of gas and air has been induced.

**2.111 Flat Flame Burner** — A burner which produces a flame resembling the shape of a fan.

**2.112 Flow Straightener (Eddy Filter)** — A perforated gauge in a burner mixing tube or burner port.

**2.113 Flue** — A passage or port for conveying products of combustion or waste gas outside air.

**2.114 Flue Break** — An opening into the secondary flue in the same room as, an additional to, the opening at the draught diverter.

**2.115 Flue Collar** — A projection or recess provided to accommodate the flue pipe.

**2.116 Flue Gases** — Products of combustion including unused air.

**2.117 Flue Gas Baffles** — A baffle incorporated to control (the flow of products of combustion and air through the heating body).

**2.118 Flue Lining** — A coating on the internal surface of a flue pipe or tiling on the internal surface of a chimney to provide protection against condensation.

**2.119 Flue Losses** — The sensible heat and latent heat of the flue gases leaving the appliance at above room temperature.

**2.120 Flue Main** — A flue carrying products of combustion from two or more appliances.

**2.121 Flue Nozzle (Flue Spigot)** — A nozzle forming the outlet end of a balanced flue duct.

**2.122 Flue Outlet** — The opening of a gas appliance through which the products of combustion are discharged.

**2.123 Flue Subsidiary** — In common flue system, a flue connecting an appliance with the main flue.

**2.124 Flue System** — A complete assembly of flue components from one or more appliances to a single terminal including primary fuel(s) and draught diverter(s), if any.

**2.125 Flued Appliance** — An appliance designed for connection to a flue for venting the products of combustion outside the room in which the appliance is situated.

**2.126 Flue Less Appliance** — An appliance designed for use without connection to a flue system, the products of combustion being allowed to mix with air of the room or space in which the appliance is situated.

**2.127 Flue Pipe** — A pipe enclosing a flue; for a double-walled type it is the inner pipe.

**2.128 Forced Circulation** — Movement of air, water or other fluid by or with the assistance of mechanical means.

**2.129 Forced-Draught Burner** — A burner in which the combustion air is provided under pressure, usually from an air fan.

**2.130 Furnace** — A heat treatment appliance in which the stock can be heated to temperatures above incandescence.

## G

**2.131 Gas** — Fuel gas as normally manufactured and/or distributed through the mains of a gas-undertaking.

**2.132 Gas Appliance** — An appliance where gas is consumed under control.

**2.133 Gas Igniter** — An ignition device built into an appliance.

**2.134 Gas Injector (Injector Jet)** — A jet removable and/or adjustable by means of which a calibrated amount of gas is allowed to pass through an orifice.

**2.135 Gas Iron** — A hand-held flat iron designed to be heated by gas.

**2.136 Gas Manifold** — The component of an appliance carrying gas to a number of separate burners.

**2.137 Gas Meter** — An instrument for measuring, indicating and sometimes recording the volume of gas which passes through it without interrupting the flow of gas.

**2.138 Gas Piston Lighter** — A lighting device attached to a cooking range incorporating its own gas supply and means of ignition.

**2.139 Gas Solenoid Valve** — An electromagnetically operated valve for opening and closing the gas supply.

**2.140 Gas Taper** — A lighting device, attached to a cooking range, incorporating its own gas supply but not its own means of ignition.

**2.141 Gas Thermostat** — A thermostat incorporating a gas valve for maintaining a desired temperature.

**2.142 Gasket** — A suitably cut-out sheet of material inserted between joint surfaces to act as a seal.

**2.143 Grill (Griller)** — An appliance for cooking food by means of radiant heat.

**2.144 Grill Area** — The area over which 75 percent of the browning is uniform.

**2.145 Grill Fret (Grill Deflector)** — The part of a grill designed to emit radiant heat.

**2.146 Grill High Level** — A grill above the hot plate of a cooking range.

**2.147 Grill Inner Cover** — The part of a grill which fits inside-the grill outer cover.

**2.148 Grill Outer Cover** — The part forming the outer top section of grill.

**2.149 Grill Pan** — A shallow container in which food is cooked under a grill the food being placed either in the grill pan or on the grill pan grid.

**2.150 Grill Pan Grid** — A grid which supports the food being cooked in grill pan.

**2.151 Grills** — A non-closable fitment for an opening through which air passes.

**2.152 Grilling Hearth (Solid Brander)** — A solid metal plate located below a grill burner on which the food is placed for simultaneous cooking on both sides.

**2.153 Grind Runners** — Projections inside a gas cooking range which support shelves.

## H

**2.154 Hearth** — A floor-level slab of non-combustible material to prevent overheating of the floor beneath a heating appliance.

**2.155 Heating Surface** — All surfaces which transmit heat from flames or flue gases to the medium to be heated.

**2.156 Hob** — It is same as a cooktop. A single-unit array of gas burners, trivets and gas control knobs. A gas hob is typically mounted within a cut-out on a kitchen bench top.

**2.157 Hot Condition** — A condition of an appliance required for some tests in which the appliance has recently been brought to thermal equilibrium but is no longer alight.

**2.158 Hot Food Cabinet** — An appliance in the form of cupboard in which plates may be heated or food stored in covered containers, with or without hearted top.

**2.159 Hot Food Cabinet Warming Space** — The total of the space in all compartments that can be usefully employed for stacking plates in cubic meters.

**2.160 Hot Plate (Hob)** — Stove having a solid plate which is heated by burners underneath, and on which the vessels to be heated rest.

**2.161 Hot Water Cylinder** — A closed cylindrical vessel used for storage and circulation of hot water.

## I

**2.162 Ignition Burner** — A removable burner incorporated as an integral part of a liquid 'or' solid fuel appliance, for igniting the fuel.

**2.163 Independent Flue System (Additional Flue)** — A flue system that is not built into a structure of a building but may be supported by attachment there, too.

**2.164 Indirect Oven** — An oven in which the product of combustion do not flow through the oven compartment.

**2.165 Indirect Oven Thermostat System** — A control system of two or more integrated automatic devices to maintain an oven temperature as selected by the operator. That portion of the system responsive to oven temperature causes operation of another portion of the system to turn on or shut off the gas supply to the oven burner.

**2.166 Induced Circulation** — Movement of air water or other fluid by or with the assistance of mechanical means.

**2.167 Injector** — A device in which gas (or air) issuing from a jet entrains and mixes with some or all the air (or gas) required for combustion.

**2.168 Injector Jet** — A jet, forming part of an injector, that may be removable and/or adjustable.

**2.169 Inner Cone** — The blue or green region within the flame produced on a burner supplied with an air/gas mixture. Combustion commences at the surface of this region.

**2.170 Input, Cold Rated** — The manufacturer's maximum recommended input when the appliance is cold and before ignition, this rate will adjust itself to the hot rated input at thermal equilibrium.

**2.171 Input, Hot Rated** — The manufacturer's maximum recommended heat input at thermal equilibrium.

**2.172 Input Rating** — The gas burning capacity of the appliance in kilocalories per hour as specified by the manufacturer, tested at ambient temperature and pressure.

**2.173 Instantaneous Water Heater** — An appliance in which water is heated only as it flows to the point of delivery.

**2.174 Insulation** — A means of reducing the heat flow through the walls of a heated space or from a heated object.

- a) *Air Space Insulation* — insulation consisting of two adjacent surfaces constructed to prevent the full circulation of air held between them; and
- b) *Solid Insulation* — Any solid (not liquid or gaseous material) used to obstruct the flow of heat.

**2.175 Indirect Heating** — A method of heating furnaces and ovens in which the hot products of combustion do not come into contact with the stock.

**2.176 Interchangeability of Gases** — The suitability of gases of different combustion characteristics for use in existing appliances without unacceptable changes in performance.

## J

**2.177 Jet** — A device containing one or more orifices from which a stream of gas and/or air is discharged.

**2.178 Jet Burner** — A self-contained aerated burner adapted for screwing into a gas manifold.

## K

**2.179 Knob** — A gripping component attached to a control (gas tap, thermostat, etc) for manually rotating it.

## L

**2.180 Leak Clamp** — A clamp used to press a gasket against a spigot and socket joint to prevent leakage.

**2.181 Limited Main Flame Establishing Period** — A period during which the main burner safety shut-off valve is permitted to be open before the pilot is extinguished and the flame safeguard is required to supervise to main flame alone.

**2.182 Lineal Seal** — The distance measured along the sealing surface of a tap in which the closure rotates.

**2.183 Lint** — A mixture of dust, fluff, fibres and droplets of grease, which can collect in the airways of the burner.

**2.184 Liquefied Petroleum Gas (LP Gas or LPG)**

— A mixture of certain light hydrocarbons of the type of commercial butane, commercial propane and commercial butane-propane mixture gaseous at normal ambient temperatures and atmospheric pressure but may be condensed to liquid state at normal ambient temperature and moderate pressure.

**2.185 LPG-Air Mixture** — Liquefied petroleum gases distributed at relatively low pressures and normal atmospheric temperatures which have been mixed with air to produce desired heating value and utilization characteristics.

**2.186 Low-water Cut-off** — A device to cut off the gas flow in the event of the water level in an appliance falling below a predetermined level.

**M**

**2.187 Main Control Valve** — A valve in the gas line before all regulating devices and the branch to the pilot(s) except when the pilot(s) are equipped with independent shut-off valves, to completely turn on or shut off the gas supply to the appliance.

**2.188 Mixer** — The combination of mixer throats, mixing tube and mixer head.

**2.189 Mixer Face** — The air inlet end of the mixer tube.

**2.190 Mixer Head** — The outlet end of the mixer tube of an injection type burner usually enlarged into which the primary air mixed with the gas stream flows.

**2.191 Mixer (Mixing) Tube (Burner Tube)** — A tube connecting the injector and the burner ports in which mixing of gas and air takes place. If frequently commences as converging section leading in succession to a throat and a diverging section; it is then often erroneously called at the venturi tube.

**2.192 Mixer Throat** — The inlet end of the mixing tube which has the smallest cross-sectional area.

**2.193 Mobile Appliance** — An appliance mounted on wheels or skids so that it can be moved from place to place as required.

**2.194 Multipoint Water Heater** — An instantaneous or storage water heater designed to deliver hot water at several points.

**N**

**2.195 Natural Circulation** — The movement of heated or cooled air, water or other fluid unassisted by mechanical means.

**2.196 Natural Draught** — The air supply induced by the lowering of pressure due to warmed air arising in a chimney.

**2.197 Natural Draught Burner (Atmospheric Burner)** — An aerated burner where the combustion air is entrained at atmospheric pressure.

**2.198 Natural Gas** — The gaseous hydrocarbons produced from the underground deposits of oilfields. The gas is described ‘wet’ or ‘dry’ according to association of liquid hydrocarbons with it.

**2.199 Natural Gas Liquids (NGL)** — Natural gas liquids is the natural gas condensate produced from natural gas processing. Natural gas liquids include the LPG gases propane and butane, as well as the heavier liquid hydrocarbons — pentanes, hexane, heptane, octane and nonane.

**2.200 Niting** — (a) parts integral with, or fitted to, a valve, cock or tap to limit the turning angle of the plug, also (b) limiting the turning angle by such means.

**2.201 Niting Washer** — Niting by means of a washer moving with the plug lugs which engage stops on the body of cock or tap at the limits or angular movement of the plug to coincide with the ON and OFF positions.

**2.202 Nominal Flow Ratio** — The flow rate of a fluid at a specified pressure loss as claimed by the manufacturer.

**2.203 Non-return Valve** — A device that allows flow in only one direction through it.

**2.204 Normal Cold Pressure** — The pressure required at the test point to give the cold rated input. This pressure will adjust itself to the normal hot pressure at thermal equilibrium.

**2.205 Normal Hot Pressure** — The pressure at the test point which gives the hot rated input.

**2.206 Normal Test Pressure** — The pressure specified for testing purposes at which adjustment of burner ratings and primary air adjustments are made.

**2.207 Nozzle** — It is generally the inlet nozzle of a defined shape where a flexible tubing is connected carrying the gas supply to the appliance.

**O**

**2.208 Operational Torque** — The torque to turn a directly operated tap at any temperature over the range of working temperatures declared by manufacturer when the tap is operated at an angular velocity of 3 rad/sec.

**2.209 Orifice** — The opening in an orifice cap, orifice-spud or other device whereby the flow of gas is limited and through which the gas is discharged.

**2.210 Oven** — An appliance for baking and roasting of food items.

- a) *Directly Heating Oven (Internally Heated Oven)* — An oven in which the burners are situated, and the products of combustion circulate, inside the oven space;
- b) *Indirectly Heated Oven (Externally Heated Oven)* — An oven in which the burners are situated outside the oven space and the products of combustion do not enter it; and
- c) *Semi-Directly-Heated Oven (Semi-Externally Heated Oven)* — An oven in which the burners are situated outside the oven space but the products of combustion pass into it.

**2.211 Oven Deck** — The surface of an oven on which cooking pans or materials, to be cooked are placed during the cooking process.

**2.212 Oven Roof Removable** — A panel forming the inner roof of an oven which can be removed by cleaning, etc.

**2.213 Oven Wall Removable (Left Hand, Right Hand, Back)** — Panels forming the inner side of an oven which can be removed for cleaning, etc.

**2.214 Overhead Radiant Heater** — An appliance designed for mounting above head level to heat the space beneath it by radiation.

**2.215 Oven** — A heat-treatment appliance that heats the stock to a temperature below incandescence.

**P**

**2.216 Pan Boiling (Directly Heated/Jacketed)** — An appliance either incorporating a single directly heated vessel generally of more than 45 litres capacity, for boiling food in bulk or a coiling pan with a second pan of slightly smaller size fixed inside to which heat is transferred from hot water or steam in the outer pan.

**2.217 Pan Brat** — A heated tilting pan of about 13 cm depth used for bulk shallow frying of, for example, eggs, bacon, sausages, etc.

**2.218 Pan Supports** — A framework of the appliance on which the cooking vessels rest.

**2.219 Pastry Oven** — A shallow oven, usually taking trays at only one level, designed to give very even temperature conditions. Several units may be arranged one above the other, or a number of compartments or decks may be incorporated in a deeper oven.

**2.220 Pre-Ignitable Burner** — A burner in which a flame initiated at the air inlet part passes to the burner parts where it continues to burn.

**2.221 Permanent Pilot** — A pilot which is intended to be kept permanently alight and is controlled independently of the main gas burners.

**2.222 Pilot** — A small gas flame for igniting gas at the burner ports. (In specific circumstances the main flame at low rate may be used in order to obviate the need for a pilot flame.)

**2.223 Pilot Flame Establishment** — The establishment of a proved and supervised pilot flame.

**2.224 Pilot Flame Ignition Period** — The period through which the ignition spark remains energized and during which the pilot safety shut-off valve is permitted to be open before the flame safeguard is required to supervise the pilot flame.

**2.225 Pilot Flame Proving Period** — The period during which the pilot flame is supervised following the cessation of the spark and before the opening of the main gas safety shut-off valve.

**2.226 Pilot Fully Protected** — The pilot protected against the flame failure by a flame failure device.

**2.227 Pilot Interrupted/Pilot Transient** — A pilot which is automatically ignited each time the burner is started up and which is extinguished automatically at the end of the main flame-establishing period.

**2.228 Pilot Ladder** — A bar burner of small gas consumption, providing pilot ignition for a number of space burners.

**2.229 Pilot Pressure Protected** — A pilot protected against failure of the gas supply by means of a low pressure cut-off valve of the manually re-set type.

**2.230 Pilot Semi Permanent** — A pilot which comes on with the main burner and remains alight during the whole of their period that the main burner is on.

**2.231 Pilot-Turn-Down Test** — A test conducted to determine whether the main flame ignites reliably

and smoothly when the pilot flame is turned down to one-half of the flow rate at which it will just continue to actuate the flame detector.

**2.232 Pinhole Burner** — A burner assembly of which the burner ports are a number of very small holes.

**2.233 Piped Natural Gas (PNG)** — When natural gas that is methane ( $\text{CH}_4$ ) is delivered through pipe, it is called as piped natural gas (PNG).

**2.234 Piezo unit** — A spark ignition device in which electric current is generated by the stressing of ceramic material.

**2.235 Plate Air Guide** — A plate designed to control the flow of secondly air for combustion, fitted below the radiants and in some instances used to support the radiants.

**2.236 Plug Tap** — A tap that is operated by rotating a taper plug in a mating bore.

**2.237 Poppet Valve** — A valve in which the seal is achieved by the axial movement of a closing member against a sealing face substantially at right-angles to the direction of the axial movement.

**2.238 Portable Appliance** — An appliance designed to be carried by the user, from place to place as required.

**2.239 Power Burner** — A burner in which either gas or air or both are supplied at a pressure exceeding the line pressure (for gas) and the atmospheric pressure (for air); this added pressure being applied at the burner.

**2.240 Pre-aerated Burner** — An aerated burner to which the gas and primary air supplied are already mixed.

**2.241 Pre-mix Air-Gas System** — A pre-aerated burner system in which gas is mixed in a predetermined and adjustable ratio with part or all of the air for combustion.

**2.242 Premixing Burner** — A power burner in which all the air for combustion is mixed with gas as primary air.

**2.243 Pressure Burner** — A burner which is supplied with an air-gas mixture under pressure usually from  $0.175 \text{ kN/m}^2$  to  $2.450 \text{ kN/m}^2$  ( $1.75 \text{ gf/cm}^2$  to  $24.50 \text{ gf/cm}^2$  approximately) and occasionally higher.

**2.244 Pressure Regulator** — A device used for controlling and maintaining a uniformed gas supply pressure at its outlet.

**2.245 Pressure Relief Valve** — A valve in an oven or flue system designed to yield safety to an abnormal increase of internal pressure.

**2.246 Pressure Valve-Differential** — A gas control on an instantaneous water heater operated by the pressure difference created by water flow through a venture throat or an orifice.

**2.247 Primary Air** — Air introduced into gas steam before it leaves the burner port.

**2.248 Primary Circuit for Water** — The flow and return circuit through which water circulates between the water-heater and the cylinder, tank or calorifier.

**2.249 Primary Flow** — The pipe conveying water from the heater or boiler to the cylinder or tank.

**2.250 Primary Flue** — A flue connecting an appliance to a draught diverter.

**2.251 Products Deflector** — An attachment which guides in a required direction the products of combustion from a flue less appliance.

**2.252 Proving Oven** — A low-temperature oven of high humidity for proving yeast foods.

**2.253 Purge** — To free a gas conduct of air or mixture of gas and air.

**2.254 Push Button** — A component that is pushed in order to operate a control.

## R

**2.255 Rack Bottom** — The bottom part of a plate rack.

**2.256 Rack Lower Plot** — A grid below the stove of a cooking range.

**2.257 Rack Upper Plot** — A flat shelf above the hot plate of a cooking range.

**2.258 Radiant Convector Gas Fire** — A gas fire designed to emit heat by both radiation and convection.

**2.259 Radiant Cup Burner** — A cup-shaped refractory heated by an aerated spreading flame burner positioned at its centre.

**2.260 Radiant Gas Fire** — A gas fire designed to emit heat mainly by radiation.

**2.261 Rating** — The nominal maximum volumetric gas rate which a component is designed to control.

**2.262 Ratio Aspect** — The ratio of the major axis to the minor axis of the cross-section of the flue.

**2.263 Reversion Pressure** — A measure of the resistance of a gas to flame lift, indicated by the gas pressure at which a flame which has lifted at higher pressure returns to the burner port of a standard burner.

**2.264 Ribbon Strip Burner** — An aerated bar burner fitted with a metal ribbon insert forming lines of burner ports.

**2.265 Ring Burner** — A burner in the form of a toroid with series of burner ports or jets in it.

**2.266 Rod Thermostat** — A thermostat in which the sensing elements consist of a rod and a concentric tube of materials of dissimilar coefficients of expansion.

## S

**2.267 Safety Shut-off Valve** — A valve designed to stop gas flow automatically in response to a signal, primarily for safety purposes.

**2.268 Safety Tap** — A tap that cannot be turned on without first performing a deliberate additional manual operation. Such operations generally include pressing against a spring, raising a hinged member, inserting key, etc.

**2.269 Salamander** — A grill used for browning mellets, etc. A form of contact grill.

**2.270 Self-Extinguishing Burner** — A burner designed so that the flame is unstable at the injector if it lights back, or if a light is supplied there.

**2.271 Scale** — Crust deposit on the surface of waterways.

**2.272 Secondary Air** — Air admitted to the combustion zone after combustion with primary air has commenced.

**2.273 Secondary Circuit of Water** — A subsidiary circuit in which hot water circulates between the cylinder or tank and the draw-off branches.

**2.274 Secondary Flue** — The part of an open flue system connecting a draught diverter to the terminal.

**2.275 Securing Rods, Wall Plate** — The rods by which the outer wall plate is attached to the inner wall plate of a balanced flue terminal.

**2.276 Semi-Automatic Valve (for Gas Control)** — A valve that is opened manually and closed automatically, or vice versa.

**2.277 Semi-Rigid Connection** — A readily manipulated tube to facilitate the quick installation of an appliance in a fixed position.

**2.278 Service Suitability Number** — It is a number of a tap which designates the degree of severity of service for which the tap is intended.

**2.279 Simmer Burner** — A burner designed for simmering, often thermostatically controlled.

**2.280 Simplex Burner** — A burner which can be operated only as a whole a burner gas tap.

**2.281 Single Point Water Heater** — An instantaneous or storage water heater designed to deliver hot water at one point.

**2.282 Size Piping** — The size of the nominal diameter of piping attached to the largest connection.

**2.283 Snap Acting Thermostat** — A thermostat working at two positions may be high/low or ON/OFF.

**2.284 Socket** — A cylindrical pipe fitting having two female ends into which pipes or fittings may be connected to effect a joint.

**2.285 Soot** — Un-brunt carbon particles present in a flame.

**2.286 Sooting Number** — A measure of the sooting propensity of a gas obtained by determining the volume rate of flow of air required to prevent soot-tailing of the flame of the gas in a standard sooting test burner.

**2.287 Soundness** — Absence of external leakage greater than the permissible limit.

**2.288 Soundness Test** — A test to check that leakage does not exceed a specified limit.

**2.289 Spark Ignition** — Ignition of an air/gas mixture by means of an electrical discharge from a sparking plug or suitable electrode or flint stone.

**2.290 Space Heating** — The heating of one or more rooms or other spaces to produce a desired temperature therein.

**2.291 Specific Gravity (Relative Density)** — The ratio of the mass of unit volume of dry gas to that of unit volume of dry air under the same conditions of temperature and pressure.

**2.292 Spillage Tray** — A tray located under burner(s) for collection of spillage from cooking vessels.

**2.293 Splash Back** — A vertical panel mounted along with back edge of a hot plate.

**2.294 Stoichiometric Mixture** — Mixture of gas and air in proportions determined by the theoretical air requirement.

**2.295 Storage Water Heater** — An appliance in which a volume of water is heated under thermostatic control and stored for use when required.

**2.296 Stove** — An assembly of one or more burners forming a separate unit allowing direct contact between the flames or hot gases from the burners and the vessel above them.

**2.297 Stove Bars** — Bars on a stove which support the vessels being heated.

**2.298 Surface Combustion** — Combustion with an almost imperceptible flame on an incandescent surface achieved by passing a mixture of gas and air through a porous or perforated surface.

## T

**2.299 Tankless Water Heater** — As the name implies, a tankless water heater does not have the traditional large storage tank. These units only heat the water as it passes through. These systems are also called 'continuous flow' or 'instant' hot water heaters.

**2.300 Tap** — A type of valve on an appliance that controls fluid flow and will be liable to be kept in off position when appliance is not in operation.

**2.301 Temperature Range** — The difference between the controlled temperatures of the sensing element at the maximum and minimum scale positions.

**2.302 Terminal** — A device fitted at the end of a flue to allow or assist products of combustion to escape, minimize down draught and prevent entry of material which might block the flue.

**2.303 Theoretical Air Requirement** — The calculated volume of air required for complete combustion of unit volume of a gas (also called stoichiometric air).

**2.304 Thermal Differential** — For a snap-acting thermostat at a particular setting, the difference between the temperatures at which the valve opens and closes.

**2.305 Thermal Log** — The difference between the effective temperature of the sensing element and that of the medium in which it is located.

**2.306 Thermostat** — A thermally actuated control device for maintaining a desired temperature.

**2.307 Thermostat Adjustment** — The regulation of thermostat, normally by the manufacturer, to ensure correct calibration.

**2.308 Thermostat Gas** — An automatic device actuated by temperature change, alone without auxiliary power, designed to control the gas supply to a burner or burners, in order to maintain temperature between predetermined limits and in which the thermal actuating element is an integral part of the device.

**2.309 Thermostat Gas, Snap-Acting** — A rapidly acting thermostat that switches the gas flow rate instantly between closed and open position.

**2.310 Thermostat, Graduating** — A thermostat which changes from the completely open to completely closed position or vice versa quickly but not with a snap.

**2.311 Thermostat Hysteresis** — The difference between the equilibrium temperatures in the controlled environment when the same thermostat setting has been made from opposite directions.

**2.312 Thermostat Setting** — A position on the thermostat scale selected by the user.

**2.313 Toasted Area** — The area of the grill grid over which bread can be toasted.

**2.314 Tunnel Burner** — A burner in which combustion takes place inside a refractory or metallic duct.

## U

**2.315 U-Duct** — A duct in the form of a 'U', the ends being open and adjacent one limb of which provides combustion air whilst to the other limb are fitted room sealed appliances.

**2.316 Union** — A composite fitting, incorporating a fastening but to facilitate the connection and disconnection of pipes, fittings and appliances.

**2.317 Upright Burner** — A lighting burner in which the gas flame is above the burner port.

## V

**2.318 Valve** — A device used to stop or regulate the flow of fluid by the closure or partial closure of an orifice.

**2.319 Vapour Pressure** — The pressure created by the vapour of a substance in an enclosed space containing the particular substance.

**2.320 Vent** — A non-adjustable purpose-made opening or duct that is designed to allow the passage of fluid at all times.

**2.321 Ventilation** — The process of supplying fresh air to, and removing vitiated air from, a room or internal space.

**2.322 Vitiation** — Contamination of air, specially by combustion products, with consequent reduction of oxygen content.

## W

**2.323 Wall Plate, Inner** — The internal component of a balanced flue terminal adjacent to the appliance.

**2.324 Wall Plate, Outer** — The external component of a balanced flue terminal through which air is drawn from combustion and the products of combustion are passed.

**2.325 Water Circulator** — A water heating appliance primarily designed for the supply of domestic hot water in conjunction with a separate storage vessel.

**2.326 Water Governor** — A device for automatic regulation of water flow rate.

**2.327 Weep Tube** — A small diameter tubing for conveying a weep flow or gas operating a relay valve.

**2.328 Wobbe Number** — The heat release when a gas is burned at a constant gas supply pressure, expressed by:

$$\frac{\text{gross calorific value of the gas}}{\sqrt{\text{relative density of the gas}}}$$

**2.329 Working Pressure** — The minimum pressure at the inlet of an appliance which will ensure that the rated heat input is achieved.

## Y

**2.330 Yellow Flame Burner** — A burner in which secondary air only is depended upon for combustion of the gas.

**2.331 Yellow Tipping** — The appearance of a yellow colour at the top periphery of a flame.

**ANNEX A**  
*(Foreword)*

**COMMITTEE COMPOSITION**

Domestic and Commercial Gas Burning Appliances Sectional Committee, MED 23

<i>Organization</i>	<i>Representative(s)</i>
L.P.G. Equipment Research Centre, Bengaluru	SHRI ASHISH BERA ( <b>Chairperson</b> )
Agnisumukh, Bengaluru	SHRI HARI RAO
Ariston Thermo India Private Limited, Pune	SHRI ABHIJIT BANSHELIKAR SHRI MAHESH BHANGALE ( <i>Alternate</i> )
Bharat Petroleum Corporation Limited, Mumbai	SHRI HARI BABU BANOTH SHRI MOHIT RANE ( <i>Alternate</i> )
BSH Household Appliances Manufacturing Private Limited, Chennai	SHRI VIJAY KUMAR LOGANATHAN
CSIR - Indian Institute of Petroleum, Dehradun	SHRI PANKAJ KUMAR ARYA
Bureau of Energy Efficiency, New Delhi	SHRIMATI PRAVATANALINI SAMAL SHRI KAMRAN SHAIKH ( <i>Alternate</i> )
Delton Industries, New Delhi	SHRI R. C. NANGIA SHRI VIVEK NANGIA ( <i>Alternate</i> )
Directorate General of Quality Assurance (Stores), Kanpur	SHRI H. H. P. TIWARI
Gorani Industries Limited, Indore	SHRI ANIL GORANI
Goyal Engineers Private Limited, New Delhi	SHRI AJAY GOYAL SHRI NEERAJ GOYAL ( <i>Alternate</i> )
Hindustan Petroleum Corporation Limited, Mumbai	SHRI RAKESH G. KHADE SHRI SUBRAMANI SIVA SHANKAR ( <i>Alternate</i> )
Kabsons Gas Equipments Pvt Ltd, Hyderabad	SHRI SATISH KABRA
Indian Institute of Technology Guwahati, Guwahati	SHRI MUTHU KUMAR
Indian Oil Corporation (R and D Centre), Faridabad	SHRI J. SHYAM SWAROOP
Indraprastha Gas Limited, New Delhi	SHRI PAWAN KUMAR SHRI ANUPE FRANCIS ( <i>Alternate</i> )
L.P.G. Equipment Research Centre, Bengaluru	SHRI P. R. DEODHAR
LPG Gas Stoves Association, New Delhi	SHRI YUGAL MALHOTRA
Mahanagar Gas Limited, Mumbai	SHRI NAVNEEN GUPTA SHRI B. RAM SUDHEER ( <i>Alternate</i> )
Rama Domestic Appliances, New Delhi	SHRI AMARJEET SINGH KOHLI SHRI MANMOHAN KRISHNAN ( <i>Alternate</i> )
Shri Krishna Test House, New Delhi	SHRI SUNIL TALWAR
Sunflame Enterprises Private Limited, Faridabad	SHRI K. L. VERMA SHRI SANDEEP JUNEJA ( <i>Alternate</i> )

<i>Organization</i>	<i>Representative(s)</i>
Vanaz Engineers Limited, Pune  <i>In Personal Capacity S-139, Greater Kailash-I (1<sup>st</sup> &amp; 2<sup>nd</sup> Floor), New Delhi - 110048</i>	SHRI A. A. TAMBOLI SHRI V. N. PUJARI ( <i>Alternate</i> )
BIS Directorate General	SHRI M. K. GUPTA
	SHRI NAVINDRA GAUTAM, SCIENTIST 'E'/DIRECTOR AND HEAD (MECHANICAL ENGINEERING) [REPRESENTING DIRECTOR GENERAL ( <i>Ex-officio</i> )]
<i>Member Secretary</i> SHRI SANDEEP KESHAV SCIENTIST 'C'/DEPUTY DIRECTOR (MECHANICAL ENGINEERING), BIS	





## Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 2016* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

### Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Head (Publication & Sales), BIS.

### Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website- www.bis.gov.in or www.standardsbis.in.

This Indian Standard has been developed from Doc No.: MED 23 (20618).

### Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

## BUREAU OF INDIAN STANDARDS

### Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002  
Telephones: 2323 0131, 2323 3375, 2323 9402

Website: [www.bis.gov.in](http://www.bis.gov.in)

### Regional Offices:

Central	: 601/A, Konnectus Tower -1, 6 <sup>th</sup> Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	{ 2323 7617
Eastern	: 8 <sup>th</sup> Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	{ 2367 0012 2320 9474
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	{ 265 9930
Southern	: C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	{ 2254 1442 2254 1216
Western	: Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093	{ 2821 8093

**Branches :** AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. CHANDIGARH. CHENNAI.  
COIMBATORE. DEHRADUN. DELHI. FARIDABAD. GHAZIABAD. GUWAHATI.  
HIMACHAL PRADESH. HUBLI. HYDERABAD. JAIPUR. JAMMU & KASHMIR.  
JAMSHEDPUR. KOCHI. KOLKATA. LUCKNOW. MADURAI. MUMBAI. NAGPUR.  
NOIDA. PANIPAT. PATNA. PUNE. RAIPUR. RAJKOT. SURAT. VISAKHAPATNAM.